1859

Board of arts and manufactures for Lower Canada.

Report of the sub-committee, Jan. 4th, 1859.

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REPORT

OF THE

SUB-COMMITTEE

OF THE

Board of Arts and Manufactures

FOR LOWER CANADA,

PRESENTED AT THE MEETING OF THE BOARD, HELD ON THE 4TH DAY OF JANUARY, 1859,

TOGETHER WITH THE

MINUTES OF THE PROCEEDINGS OF THE BOARD AT THAT MEETING;

AND

THE REPORT UPON INSTITUTIONS IN LONDON, DUBLIN, EDINBURGH AND PARIS, FOR THE PROMOTION OF INDUSTRIAL EDUCATION, BY B. CHAMBERLIN, B.C.L.,
Secretary of the Board.

MONTREAL:
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EXTRACTED LIST FROM THE REGISTER

OF THE MEMBERS OF THE

Board of Arts and Manufactures

FOR LOWER CANADA,

CORRECTED TO 1st FEBRUARY, 1859.

EX OFFICIO.

George W. Weaver, President Montreal Mechanics' Institute.
Hon. Luther H. Holton, President Montreal Board of Trade.
Hon. P. J. O. Chauveau, LL.D., Superintendent of Education for Lower Canada.
James Gillespie, President Quebec Board of Trade.
J. W. Dawson, CL.D., F.G.S., Principal and Professor McGill College.
H. A. Howe, M.A., Professor McGill College.
W. Sutherland, M.D., do do
Charles Smallwood, M.D., LL.D., Professor McGill College.
M. J. Hamilton, C.E., do do
Alexander Johnson, B.A., do do
T. Sterry Hunt, S.D., Professor Laval University.
H. H. Miles, M.A., Professor Bishops' College.
Rev. E. Hamel, Professor Laval University.
Rev. O. Brunet do do
Rev. O. Audet, Professor Séminaire de Québec.
M. D. Dion, do do do
Rev. L. L. Belleau do do do
Rev. F. Desaulniers, S.D., A.M., Professor College de Nicolet.
M. T. Gouin, Professor College de Nicolet.
Rev. F. Pilote, Ste. Anne, Kamouraska.
Rev. I. Desaulniers, Professor College de St. Hyacinthe.
Rev. A. Dumesnils do do do
Rev. F. Gigault, do do do
Rev. M. L. Dagenais, do do St. Thérèse.
Rev. E. Cleveland, M.A., Professor St. Francis College, Richmond.

Rev. G. Laporte, Professor L'Assomption College.
Rev. J. Havequez, Professor Ste. Marie College, Montreal.
Rev. P. L. Carrez, do do do do
J. Boisvert, Professor Joliette College.
L. Michaud, do do
Rev. F. F. Hermenegilde, Professor, Notre Dame de Levi.
Rev. F. Bertram, do do do.
J. Michaud, Professor Rigaud College.
Rev. C. Clèment, Professor College St. Marie de Monnoir.
N. Gauthier, do do do do
The President Lachute Mechanics' Institute.
" Chambly do
" Sorel do
" St. Hyacinthe do
" Iberville do
" Chatham, C.E., do
" St. Andrews, do

DELEGATES.

Mechanics' Institute, Montreal.—Messrs. David Brown, H. Munro, E. Murphy, W. Spier, J. Redpath, A. A. Stevenson, C. Garth, W. Rodden, N. B. Corse, A. Murray, W. N. Milln, H. Bulmer, A. Perry, B. Chamberlin, A. Ramsay, W. Parkyn, H. Lyman, A. Cantin, W. P. Bartley, and Dr. Bernard
" Lachute—Mr. Thomas Barron.
" Chambly—Mr. Thomas Findlay.
" Sorel—Mr. William Crail.
" St. Hyacinthe—Messrs. Jean Bte. Gagnon, and Michel Derocher.
" St. Cesaire—Mr. J. Frêchette.
Board of Trade—Montreal—Hon. John Young.
" Quebec—Mr. Henry J. Noad.

Erratum on page 58, in Account Current, 4th line on Dr. side—for "1858" read "1856."

ANNUAL MEETING

OF THE

Board of Arts and Manufactures

FOR LOWER CANADA.

BOARD ROOMS, MECHANICS' HALL,
Montreal, 4th January, 1859.

The Board met this day, at two o'clock, P. M., in the Board Rooms, Mechanics' Hall, when were present:—Mr. David Brown, President, in the Chair; Hon. P. J. O. Chauveau, Vice-President; Professor Dawson; Professor Smallwood; Messrs. Redpath, Weaver, Garth, Bulmer, Rodden, Perry, Milln, Stevenson, Bernard, Munro, Bartley, Ramsay, Murray, H. Lyman, W. Parkyn, Murphy, N. B. Corse, Treasurer; B. Chamberlin, Secretary.

The minutes of the previous Meeting having been read and confirmed, the Secretary read the Quarterly Report of the Sub-Committee, which, having been submitted to the Board, accompanied by the Secretary's own Report, upon the Institutions visited by him in the British Islands and Paris, of which he gave an oral synopsis,—

It was thereupon moved by Professor Swallwood, seconded by Mr. H. Lyman, and resolved:—"That the Reports be adopted and printed under the superintendence of the Sub-Committee."

Mr. Milln desired to be informed what steps the Board were to take with respect to the next Annual Provincial Exhibition.

The President stated, in reply, that the Board had been unable to take charge of the Industrial Department of the Exhibition last year, because sufficient funds had not been placed at its disposal by the Government. The part to be taken this year must also depend upon the funds furnished.

The Secretary further stated that the financial year of the Board must be reckoned, for practical purposes, from 1st July to 1st July, and the sum of $2000 allowed last year to the Board must be used for current expenses up to July next. The money to be used for the Autumn Exhibition must depend upon the grant made in the coming Spring.

Mr. Milln said that the Annual Exhibitions formed one of the most important objects for the promotion of which the Board was established. He moved, therefore, seconded by Mr. Garth:—"That it be an instruction to the Sub-Committee about to be elected, to represent to the Government the necessity for a large appropriation to enable the Board to render fitting assistance in obtaining, at the Annual Provincial Exhibition, a proper representation of the products of the Arts and Manufactures of the Province." The motion being put from the chair was carried.

Professor Dawson moved, seconded by Mr. H. Lyman: "That the procuring a Seal be left to the Sub-Committee, with instructions to obtain one as speedily as possible."—Carried.

Mr. Bulmer moved, seconded by Dr. Bernard, and it was resolved:—"That it be an instruction to the Sub-Committee that in case it is decided to hold another Great Exhibition at London in 1861, as is now proposed, they urge upon the Government and Legislature the necessity of taking immediate steps to have Canada properly represented."

The Treasurer submitted his accounts for the past year, showing a balance of upwards of $1,700 at the credit of the Board. He stated, however, that there were accounts in

his hands for liquidation, which would reduce the balance to $1,500.

Messrs. Bulmer and H. Lyman were named Auditors to audit the Treasurer's Account, and having examined the same and the accompanying vouchers, certified it to be correct.

The President of the Mechanics' Institute of Montreal submitted a duly attested list of 401 mechanic members of that body, and the following list of delegates elected at its first meeting in January, held on the evening of the 3rd inst. viz. :—Messrs. David Brown, H. Munro, E. Murphy, W. Spier, J. Redpath, A. A. Stevenson, C. Garth, W. Rodden, N. B. Corse, A. Murray, W. M. Milln, H. Bulmer, A. Perry, B. Chamberlin, A. Ramsay, W. Parkyn, H. Lyman, A. Cantin, W. P. Bartley, and Dr. Bernard.

The Board then proceeded to ballot for Officers and Members of the Sub-Committee for the ensuing year. Messrs. Stevenson and Murray were appointed Scrutineers.

On the vote for President, being taken, twenty ballots were cast, of which Mr. David Brown received thirteen, and was declared duly elected.

The vote for Vice-President being taken, twenty ballots were cast, of which seventeen were in favor of the Hon. P. J. O. Chauveau, LL.D., who was declared duly elected.

The vote for Secretary being then taken, twenty-one ballots were cast, of which nineteen were in favor of Mr Brown Chamberlin, B.C.L., who was declared duly elected.

The vote for Treasurer being taken, twenty-one ballots were cast, sixteen of which being in favor of Mr. N. B. Corse, he was declared duly elected.

The vote for nine members of Sub-Committee was then taken, when twenty-two ballots were cast, of which seventeen were in favor of Professor Dawson; fifteen in favor of Messrs. Weaver, Chamberlin, and Corse; and thirteen in favor of Messrs. Bartley, Perry, Milln, Murray and Rodden

—which nine gentlemen were accordingly declared duly elected.

Mr. Milln brought under the consideration of the Board the subject of the Patent Laws, and the necessity that the Sub-Committee should watch any proposed amendments in favor of foreign inventors to the detriment of Canadian Manufacturers.

Mr. Perry contended that we should allow foreigners the same advantages we enjoyed ourselves. Canada was the only country wherein a foreigner could not take out a patent. He thought that this should be looked into.

Mr. Rodden would be opposed now to grant to the citizens of the United States any of the privileges enjoyed by Canadian inventors; he would do so if they reciprocated in manufactures as well as inventions. He hoped that the officers of the Board would watch the proceedings of the Legislature in regard to the Patent Law.

Mr. Milln also asked if any arrangement had been made with the Government, to receive duplicates of the models of patented inventions.

The Secretary stated that a correspondence had been held with the Government on the subject; the Sub-Committee had been unable as yet to obtain a promise that such duplicates would be furnished.

Mr. Perry thought the better way was to bring out from France model makers, men trained all their lives to that description of work, whose services could be obtained on reasonable terms for a stated period, to prepare such models as the Board required.

Some conversation ensued then upon the unsatisfactory state of the Patent Laws, suits being pending to test the validity of patents, which were granted with too great facility, and without sufficient examination by the Government officers.

After some further conversation upon the subject,

It was moved by Mr. Henry Lyman, seconded by Mr. J. Redpath, and resolved,—"That the thanks of this Board are due, and are hereby tendered to Brown Chamberlin, Esq., B.C.L., Secretary, for the very valuable services rendered by him in procuring information and valuable works, and in other ways promoting the success of this Institution, which is so intimately connected with the industrial and material interests of this Province, during his recent visit to Great Britain and France."

On motion of Dr. Bernard, seconded by Mr. Stevenson, the thanks of the Board were voted to the President, Vice-President, Treasurer, and members of the Sub-Committee, for their services during the past year.

The meeting then adjourned.

B. CHAMBERLIN,
Secretary.

REPORT OF SUB-COMMITTEE.

Board Rooms, Mechanics' Hall,
Montreal, 4th January, 1859.

The Sub-Committee have the honor to report that their labors during the year have been confined to the superintendence of the course of lectures undertaken under their auspices in this city, and the endeavor to establish classes in connection with the several affiliated institutions. Of the lectures delivered during the last winter, those of Professor Miles, on the very important subject of ventilation, have been published, and the Sub-Committee have taken 150 copies at the publisher's prices for gratuitous circulation. Professor Kendall, of Toronto, has already delivered the first of the present winter's course of lectures, a very interesting paper on "The connection between experiment and theory in the progress of scientific discovery." This lecture also is in press, and your Sub-Committee have subscribed for 150 copies for distribution. It remains for the Board to decide whether it is not advisable to translate both these lectures, for circulation among the members of Mechanics' Institutes made up principally of those speaking the French language.

During the Secretary's absence in Europe, which continued from May till nearly the end of October, your Sub-Committee did not enter upon the work of beginning a Museum or Library of Reference, or establishing any scheme of competitive examinations for prizes or diplomas, desiring to be in possession of such information and aid as he might procure abroad, ere embarking in any further expenditure. His report of work done, and upon the operations of the institutions visited on behalf of the Board, is herewith submitted for the information of the Board.

The present course of lectures will be continued by T. S. Hunt, Esq., who will deliver a series of six upon the Economic Materials of Canada, and their uses in the arts, than which your Sub-Committee conceive there can be no more important subject, nor one better worthy the attention of the Board, or those to whom it is called upon to furnish instruction.

The Sub-Committee has also proffered its aid to affiliated institutions to procure, if possible, lecturers to visit and lecture to their members, but none of those institutions have as yet informed the Committee in what manner they desire such aid rendered. In some cases there are doubtless local lecturers, whose services may be obtained; in others they might desire them sent from Montreal. The Sub-Committee cannot act without information on the subject; nor could

it in any case undertake to bear the whole expense of such lectures.

Your Sub-Committee has also offered moderate pecuniary aid to those affiliated Institutes which will establish classes under their auspices and superintendence, in which should be taught, besides the ordinary branches of reading, writing and arithmetic, at least three of the following, viz.: book-keeping, mechanical drawing, mathematics, grammar, English to French pupils, or French to English pupils, the elements of chemistry, the elements of natural philosophy. The Montreal and Lachute Institutes have announced the successful establishment of such classes.

There have been during the year seven affiliated Institutes, viz.: Montreal, Lachute, Chambly, Sorel, St. Hyacinthe, Iberville and St. Cesaire.

At the last quarterly meeting at which business was transacted, it will be remembered by the members of the Board that one of the delegates from the last named Institute made application to this body for aid to establish a Factory, which was rejected, for the obvious reasons then stated. Your Sub-Committee regret to state that, in reply to the circular on the subject of lectures and classes recently sent out, the Secretary of that Institute has announced its intention of withdrawing from its connection with this Board, inasmuch as it was unable to reap the anticipated advantages therefrom.

Another body, the Reading Room Union de St.

Joseph of Montreal, made application for affiliation to the Sub-Committee in June last, but upon examination of its Constitution and Rules it was found to be rather a Benefit than a Literary Association, and not open to mechanics generally; and the application was rejected upon the ground that such a body did not properly come within the purview of the law.

Two other Institutes, those at St. Athanase and St. Felix de Valois, promised last year that they would affiliate during the present year.

After the last meeting, for the despatch of business, it was ascertained that the Parliamentary grant for the year 1858 and '59 would be $2,000, which amount has since been drawn from the Provincial chest by your Treasurer, and placed at the credit of the Board in one of the Banks in this city. The sums expended in the various operations of the Board during the past year will be found stated in the detailed account submitted by the Treasurer for audit.

The Report of the Special Committee appointed to procure designs for a Seal and Prize Medal is herewith submitted. The Sub-Committee not finding the single design obtained satisfactory, have not taken steps to get it engraved, nor did they feel at liberty to act farther in the matter without the sanction of the Board, which had taken this matter into its own hands.

The Secretary reports that he has made a purchase of a few books, and received a gift from Sir

Roderick Murchison, of the publications of the Geological Survey of Britain. He has also received from the Secretary of the British Great Seal Patent Office a favorable reply to an application for the grant of the publications of that office, which number nearly 1,000 volumes. The Commissioners have not, however, definitely decided upon the application, yet there is reason to hope that in the coming spring this splendid commencement of a library of reference will be made. In addition, the Mechanics' Institute of Montreal have also offered their library of reference to the Board for a rental of ten per cent per annum upon its estimated present value, an offer which your Sub-Committee have still under consideration. Whenever either supply of books is procured additional accommodation and the assistance of a Curator or Librarian will become necessary. The room at present occupied by the Board is held at a rental of $200 per annum, including heating, lighting and attendance. The Secretary has received also in the past year an allowance of $240 to pay for assistance in writing, &c., which, however, it is proposed to reduce in the coming year, if possible. The sum expended by the Secretary during his recent tour, in travelling expenses, &c., on behalf of the Board, (under the minute of the Sub-Committee of 3rd April last, approved by this Board at its meeting, held on the 1st May last,) was £50 sterling.

Should the extension of the premises occupied

by the Board become necessary, the Sub-Committee will avail themselves of the additional space thus placed at their disposal to commence an Industrial Museum. This they feel assured can be done, in part at least, inexpensively. In Britain manufacturers gladly embrace the opportunity of placing specimens of their handiwork, with the raw material whence it is made, on exhibition in the great museums; and your Sub-Committee does not doubt that the manufacturers of this City and Province will be found equally enterprising and intelligent, and willing to lend a helping hand to found a Museum of Canadian Industry. In this connection the Sub-Committee have to refer members to the correspondence upon the table announcing that the City Council is desirous of co-operating with the Boards of Agriculture and our own Board in procuring property and erecting permanent buildings, for exhibitions, &c. In those buildings accommodation would probably be provided for the Museum and Offices of the Board. Your Sub-Committee have already named a Special Committee of conference to consult with the Committee of the City Council on the subject.

Meantime, your Sub-Committee feel that they are doing one of the most important of the works assigned to them in stimulating the giving of secondary or supplementary education to young men employed in workshops and factories, whose attendance at school has been necessarily cut

short by the demands of their family for the earnings of their daily labor, to purchase for them the necessaries of life. Your Sub-Committee have endeavored to avoid all appearance of doing the work of primary schools for which provision is made by other Parliamentary grants and the right to levy local taxes; but for the class placed in the circumstances above stated the aid of the Board or of some such institution is absolutely needed if we would have our mechanics and artizans become the intelligent workmen which they need to be, to secure their and our success in competition with the manufacturers of other lands.

Your Sub-Committee deem it their duty again to draw your attention to reforms needed in the law to make its working more effective, in order that you may instruct their successors to make application to Parliament on the subject. Complaint is made of a falling off in the revenue and a necessity for rigid economy. If economy is to be exercised, we may fairly hope that it will begin with the least useful grants, and that the Board may be made to suffer comparatively little. There are numbers of Mechanics' Institutes in the country which give little or no sign of life; which do not seem, so far as can be ascertained, to be expending the money granted them by Government for any very useful purpose — many literary associations in a similar state, which are yet receiving as large grants from the Provincial Treasury as those in-

stitutions which are really zealously aiding the work of secondary education. Agricultural Associations are placed under the control of the Provincial Board, receiving no money unless they first certify they have raised an amount themselves to put with it. So an elementary or common school receives no money unless it levies a rate at least as large as the Provincial grant; and of late the institutions of superior education—grammar and high schools, academies, and colleges, are subjected to the supervision of a Government officer to check the grants made to them. It is high time that a similar check should be arranged for the government of the *soi-disant* literary and scientific associations to which year by year such considerable sums are paid out from the Provincial Treasury. In this direction the powers of this Board require extension. To no body could the checking of this expenditure be so properly confided as to a Board at which each of these institutions may be represented upon easy terms. In this direction your Sub-Committee deem it desirable that their successors, with your assent, should endeavor to obtain the amendment of the law. They also deem it advisable that they should ask that the inconvenient name of Sub-Committee which they now enjoy should be changed to Council, the name of the similar governing body of the Boards of Trade and Societies of Agriculture in Canada, and the Society of Arts in Britain. It is found inconvenient in practice that the Jan-

uary meeting of the Board should be held at so early a day in the month as in most cases to prevent the previous election of their new delegates by the affiliated institutions. They suggest that it would be wise to ask that the January meeting should be fixed for the third Tuesday instead of the first. They also would suggest that the principal Officers of the Provincial Geological Survey be made *ex officio* members of the Board for that portion of the Province in which they may be respectively resident.

All which is respectfully submitted.

D. BROWN,
President.

B. CHAMBERLIN,
Secretary.

APPENDIX.

SECRETARY'S REPORT.

To the Sub-Committee of the Board of Arts and Manufactures for Lower Canada.

GENTLEMEN,—In conformity with a resolution of this Sub-Committee, I took occasion, while in Britain and France during the past summer, to visit the several institutions there established, likely to serve as models for the Board, and to acquire such information as might be useful in the conduct of its affairs; and have now the honor to submit my report thereupon. I had already placed myself in communication with Mr. P. LeNeve Foster, M.A., Secretary of the Society of Arts, and upon my arrival in London proceeded to seek from him such aid and co-operation as he would be willing to afford me. I may take this opportunity to state how much I was indebted to him for aid and advice respecting my labors in Britain.

The Society of Arts itself was founded in the last century by noblemen and gentlemen interested in the advancement of science, and its influence upon the Arts, Manufactures and Commerce. The Society took, and still retains, the name of "the Society for the Promotion of Arts, Manufactures and Commerce." Wherever a new invention has been made, a new avenue for commerce opened up, it has sought and found a field for its labors. Inventors have been rewarded; public attention directed to the usefulness of their inventions; new articles for manufacture brought into notice; new fields for industry developed. Such are the objects which this voluntary association set before itself, and which it has ever promoted with greater or less success. As a natural sequence and continuance to these efforts, the Society has of late taken up earnestly the education of the manufacturing classes. It has associated itself with and aided the various Mechanics' Institutes throughout the empire. It has established examinations for the purpose of drawing out the talent of their members, as well as to test the advance made from time to time in their education, and the usefulness of the means and appliances of instruction which these institutions offer. There

are annual conferences of delegates from these various affiliated institutions with the members of the Society. At one of these I had the pleasure to be present, when discussions took place respecting these examinations, secondary or supplementary education, lectures, classes, &c. I gathered, from the tone of the discussion which then took place, that it was generally believed by those who had had experience in the matter, that the old system of miscellaneous lecturing was of little use; that classes and the use of libraries furnished the best means for the education of those connected with them, and that assistance was more effectively bestowed in this direction than in any other.

In its session of 1849, the Society of Arts, under the Presidency of the Prince Consort, brought out the scheme of the Great Exhibition, which in 1851 drew together so many people, and such a wondrous collection of the products of man's genius and industry from all parts of the world. In France, from the latter years of the last century, exhibitions of the industry of that country had been held at periodical intervals; the later ones every five years, eleven being held between 1798 and 1849. "The English," says a French writer, "had regarded these exhibitions as the toys or amusements of a vain people." They had had local exhibitions, not national, though the Society of Arts had made several attempts in that direction. In 1849 they changed their opinion, and went to the opposite extreme. After the French *Exposition* of 1844, it was proposed to make that of 1849 open to all nations. The Government entertained the proposition favorably, and after the revolution of 1848, referred it to the Chambers of Commerce. In Paris they declared against it, and the scheme was dropped. But in 1849, while the French National Exhibition was going on, or just over, the idea was taken up, as we have seen, by our own Prince Consort and the Society of Arts. The history of that great exhibition is familiar to us all. Its triumphant and dazzling success has led to a repetition of its wonders in Paris, and attempts to imitate it in Dublin and New York. And now the Society of Arts is taking the preliminary steps to bring about a new World Exhibition in London in 1861—a project which will probably be carried into execution. But though all know how great and splendid the first exhibition was, not all by any means know all the lessons that it taught. It taught British manufacturers that in many respects they were behind the French; and not only was this fact apparent, but the better informed men of Britain believed they had discovered the cause of the inferiority.

Baron Dupin, after his return to Paris, having assisted at the Great Exhibition in London, in an address to the students of the *Conservatoire*

des Arts et Metiers, pointed out that Paris, with a population of scarcely more than a million of inhabitants, took 35 Council medals, while London, with 2½ millions, only took 41; that is for London only 14 medals per million of inhabitants, while Paris took 29 per million. Doubtless the comparison by cities was not so fair as comparison by nations; yet when all the circumstances are taken into consideration, it was fair enough. As Baron Dupin pointed out, France had just passed through a period of revolution and anarchy, and the evils of revolution always press most heavily on Paris. She was not in a position to make so good a show as she might otherwise have done. Britain and London labored under no such difficulties. The Exhibition was at the doors of the Londoners; Parisians had to send their products to a foreign city. The Baron proceeds to divide these awards thus:—Every million of competitors received—for the arts relating specially to Mechanism and Machines, in Paris 6 Council medals, London 1; for the Graphic and Geometric Arts—Paris 8 medals, London 3; for the Economical and Chemical Arts, Paris 8 medals, London 3; for Fine Arts, and for all the Arts in which elegance of form and perfection of taste are essential conditions, Paris 20 medals, London 4. He proceeded to point out that the British had taken silk weaving from France at the revocation of the Edict of Nantes, and Brunel had been sent over to them at the time of the revolution—that more recently they had received Morel, the jeweller, Weicht, the carver *par excellence,* Bontemps, the glass manufacturer, and Marochetti, the sculptor, from the continent, who had won for Britain four of the Council medals which it carried off. "Be assured," he continues, "that the English will continue to demand from us our designs and our draftsmen for all the products of elegance, and our artizans and artists in the crafts specially French; and then, as they did in 1851, they will compete with us without the least hesitation, making use of our soldiers and our arms. They will finish by borrowing from us even the art of possessing taste."* And now, I find that it has become fashionable among the better educated classes in Britain, to admit the justice of the sneer, conveyed in this last quoted remark of the Baron. They will tell you, "we cannot build; we cannot get up pageants; in Architecture and the Fine Arts we are deplorably behind the French." To a colonist going hence to the great towns of Britain, many things appear most magnificent and beautiful. Some of them in fact are so. The glorious dome of St. Paul's, the wonderfully beautiful façade of the New Houses of Parliament,

* See also Weiss History of the French Protestant Refugees.

and the Old Abbey, despite its ugly squat towers, are all very magnificent; and the untaught, untravelled American wonders what they can shew him in Paris so much finer. Having seen few good pictures, if any, he gloats over those to which he can get access in the Royal, National and private collections in and about the metropolis; but the travelled Cockney, at his elbow, is sure to contrast all these things unfavourably with what is to be found in the French capital. You perpetually hear the collections at the Louvre, the Luxembourg and Versailles, extolled at their expense. Only you do hear men now and then boldly and truly declare that there are more fine pictures in Britain scattered about in private collections, and only recently brought together for the first time at the great Manchester Exhibition of Art Treasures, than even in the great French collections.* Go to Paris: see the sights there, and return, and however stubborn your prejudices may be in favor of old England, you admit perforce that English humility has not altogether erred in this respect. The grand dome of St. Paul's seems not less grand, for that of the Invalides is less, but if you descend to the crypt, beneath the dome, and grope, through gas-lighted darkness, to the last resting place of Wellington and Nelson, you heave a sigh as you remember the difference between their tombs and that of Napoleon. The tomb of no hero, sage or monarch, in Britain, can vie with it for a moment. The Abbey may well compare with Notre Dame, but we look in vain for a Madeleine. The British Houses of Parliament are very fine, but they cannot be ranked with that immense pile of buildings in which the Tuileries and the Louvre are now united. Why is this? The London picture galleries are meagre and barren, compared with those at Paris, and the national collection of sculpture is hid in a cellar more like the workshop of a stone mason than a national gallery of art. But you will perchance say that this taste in the Fine Arts is but the carving and gilding of the National Temple. Britain builds with solidity, she is pre-eminent in the useful arts. Is she? and how? Let us leave the metropolis and turn to Manchester. Go to the mills where they spin and weave cotton and silk. To many of them are attached chemical laboratories and designers' *ateliers*. There, if your guide be communicative, he will tell what improvements so and so has introduced. Half the names are Swiss, or German, or French, and besides these, they have draughtsmen, designers, &c., employed in Paris and Continental Cities, to furnish them with new designs, &c. These were some

* I ought not to pass over this reference to the great Art Treasures Exhibition, without returning my thanks to J. C. Deane, Esq., the principal promoter of it—one who gave efficient aid also to the Dublin (and, if I mistake not, to the London) Exhibition, for the kind offers of service tendered and afforded me.

of the facts brought prominently out by the great International Exhibition.

After it was over, at the suggestion of the Prince Consort, a series of Lectures was delivered before the Society of Arts, (afterward published in volumes, copies of which I have procured for the Library of the Board,) to enforce the lessons taught by that exhibition. Able and experienced men of science, connected with art and manufactures, were thus drawn out to lay before the public the inferences they had drawn from the "hard facts" there set before them. Partly from these and partly from personal observation, I have gathered the hints I have already written down for your information. A Manchester man, Mr. Bazley, admits that even in many fancy cotton fabrics, the French and other continental nations, took deservedly the highest place, and I may add here, though beside my present object, a not unnecessary warning, which he gave British manufacturers and merchants not less needed now than then. "There is," he said, "unquestionably a cheapening tendency pursued by them, which, with its consequent deterioration, must inevitably lead to an ultimate diminution of business, and which it is feared is already damaging our national character, and giving foreign rivals, for their superior productions, fame and profit, exceeding our own." Further on he adds, "printed muslins, cambrics, and calicoes for dresses of great excellence and beauty were displayed, as also were furniture prints, *but for perfection in colours, and good taste in designs, the foreign goods generally were regarded as most attractive,* though of the improving and sound position of the British print trade, there can be no question." Superiority of design and skill has been met by this cheapening process. He followed this up with some remarks upon the necessity of farther education of the working classes to render the resources of the country properly available.

Again, another of these Lecturers says, whatever may have been the opinion of anybody of the position which other nations may have taken, through prejudice or honest judgment, all admit that France took the second place. Thus, as the Grecian leaders once upon a time admitted that though each was himself first, Themistocles was second, and it was therefore wisely concluded that Themistocles was really first, so the inference regarding the pre-eminence of France is obvious. Mr. Cole, who delivered the last Lecture of this course, set to work to dissipate the opinion that Britain had been distanced, making up the record differently from Baron Dupin. He shews that out of 164 Council medals 6861 British exhibitors took away 78, while 7076 foreign exhibitors carried off but 86, the proportion being about equal; but he neglects to

make the comparison with the single nation, France. Britain had half the exhibition to itself, the value of its exhibition being over £1,000,000 stg., against £675,000 foreign, including, doubtless, in the British, much heavy machinery, &c., which was not likely to be brought from abroad. And we see moreover that France, with 1747 exhibitors, won 54 medals against 78, by nearly four times the number of British. And even, Mr. Cole is forced to say, "I freely admit that in the execution of art applied to industry, the French are upon an average better educated and better workmen than ourselves." "In respect of art," he says again, "among the nations of Europe, it appears to me that much was not taught by the exhibition which was not known to the few, although a great deal was probably taught to the many." It was, indeed, teaching the many in Britain how much they had to learn. Baron Dupin attributed the disparity we have been remarking upon to the subdivision of the Parisian workmen into small gangs in many ateliers —200,000 workmen having 65,000 master-workmen to supervise their work,—and to their general intelligence. This subdivision is only practicable when many are well educated for overseers. English lecturers sought it in another direction, more favourable to mammoth workshops and the natural intelligence of British workmen.

Said the late Sir Henry de la Bêche—"The Great Exhibition, brilliant as its course has been, is not the end; it is the means to the end. You do not intend to stand still, and look back upon its past splendor as only a thing of history; you propose to consider how far you can render it available for future public good. There is a movement which cannot be mistaken, towards more general instruction connected with the industry of our country—a movement arising out of the late Exhibition. That this movement should be effective, the utmost care will be needed. . . . No doubt the commencement of the school of Mines, lately opened at the Museum of Practical Geology, has been very successful, and that there is excellent promise for the future; but this present success, and this promise for the future, seem only to point out the more strongly that industrial instruction should be extended, and that, if carefully considered with reference to the wants and habits of our country, schools in aid of the various branches of industry, now receiving no educational assistance whatever may be equally successful. Rest assured there is no want of power in our land to produce the result desired; that power has but to be aroused, and to be skilfully adjusted, to become effective. Viewed as suggestive, the deficiencies were valuable as pointing out the need of instruction generally respecting the true character of mineral raw materials, the means of extracting them, and

the method of rendering them available to men. It was not to be expected that the mass of the thousands daily visiting the Exhibition should be capable of forming a correct judgment on the subject, but it became an object of importance to endeavor to ascertain the proportion of those termed - from the kind of instruction they usually receive—the educated classes, who really appreciate such deficiencies. Beyond those whose business of life it was to take part in the commerce and industry connected with the subject, and who readily understood them, it was too clear that little knowledge of the kind was diffused. This arose from no want of power to grasp the subject, but simply that, under ordinary circumstances, this kind of knowledge had not been brought under consideration." The want of such knowledge he urges as not simply "a private matter, but a national loss," because "the amount of capital thoroughly wasted" in mining speculations, &c., and "which, if rightly employed, would have been beneficial to the public, is enormous. . . . Science is essential to progress in our (mineralogical) department, and it is most cheering to find its union with practice becoming more thoroughly appreciated in this country, where hitherto we have possessed no educational advantage as regards instruction connected with industry, possessed by many other nations. We have had the advantage of seeing, during the late Exhibition, *how eagerly our foreign brethren in industry seized upon all shewing the useful applications of science; how anxious they were to visit the localities whence illustrations of them were derived.* Let us not be laggards in the same field; let us also utilize the Exhibition for progress, and not let its suggestions pass unheeded. It has been seen, that while we had much to teach, and many were the points connected with our mineral wealth which engaged the anxious attention of our visitors from other lands, we had also much to learn. Let us strive to learn as well as teach."

Again Professor Solly concludes his lecture thus :—"With those who say that we need an enlarged and comprehensive system of National Education I agree heart and soul; but I would go even farther: I say, let us have the means of teaching the schoolmaster as well as the scholar; let us, by collecting sound facts and useful information, obtain those means of instruction in applied science, which are at present almost wholly wanting."

The Rev. Robert Willis, in his lecture on Machines and Tools for working in metal, wood, &c., says—"There has always existed an unfortunate boundary wall, or separation, between practical and scientific men, a mutual distrust or misunderstanding of their relative values, which has deprived them of many great benefits that they might have

mutually derived from each other's pursuits. It is true that in many branches of science, as in chemistry, geology, and botany, this barrier has, to a great extent, been broken through; the practical man has found the benefit of scientific generalizations, and the theorist has been compelled to seek the facts upon which his theories are to be based in the mines and manufactories, thus compelling the two classes to work together and learn to understand each other. Still, there remains too much of the ancient contempt for "theory," and of an overweening and conceited value for "facts" and "practice." In no department of science is this carried to a greater extent than between the mathematical and practical mechanics; and yet the mental process by which the parts of a complex machine are contrived and arranged in the brain of the inventor requires the geometrical faculty, as it is called, to a very high extent; that is to say, the power of conceiving mentally the relations of the parts of complex figures in space. So that, in truth, a man gifted by Nature as a mechanist, is also qualified as a geometrician; and the untaught inventor, struggling to give form and reality to his conceptions of a new machine, is, in reality, practising imperfectly and unknowingly the very geometrical science he despises, and which, if he had acquired its elements, would at once have shown him how to systematise and arrange his ideas. For the system of mathematics, as it now exists, is the accumulated result of many centuries' work of men thus naturally gifted, and the man who now, directing this mental power to the confection of machines, professes to exercise it "self-taught," acts on the presumption that he can dispense with the labors of those men of mighty intellect who worked so long to prepare a system for those who were to come after them. To ignore such labors is a piece of presumption, and a pure waste of intellectual labor. . . . To perfect and reduce to practice the idea of a new machine is no light effort of the intellect, and in proportion to the education of the inventor, so will his steps be rendered surer, more direct, and more rapid. . . . In the absence of proper technical knowledge of theoretical mechanics, the proposed machine will only arrive at its perfect and permanent form through a series of abortive attempts, which, by a succession of failures and repairs, may perhaps lead to the removal of the weak points of the contrivance. . . . A profound knowledge of theoretical mechanics is not necessary for all parties concerned about machines, any more than an elaborate acquaintance with the entire subject of astronomy is needed by every sailor. Yet sailors have no horror of mathematics, and know very well how to make use of the parts that are prepared for them. And all men who are engaged in the contrivance of machinery, whether in *reducing to practice their own inventions or those of others*, should

be competently instructed in the elements of the subject, as well as in the history of machinery; and the artizans themselves would find their labor greatly facilitated by a knowledge of geometry and mechanics to a limited extent, proportioned to their requirements. We may hope that one of the permanent results of the Exhibition may be, that men's minds being more forcibly led to the consideration of the subject, a system of professional education for practical men may be organised, so as to enable every one to obtain just so much as may be necessary for him in his own position. The preparation of such a system of education is difficult, and requires great care to avoid the error of teaching much that is unnecessary, and that, in fact, cannot be comprehended unless by a student, who intends to devote much more time, and to enter much more profoundly into those branches of study, than is contemplated for the purposes we are now considering. But we know that difficulties of this kind have been already encountered, and, as it appears, successfully overcome in France, after failures had taught experience. . . . . Our theoretical writers are rapidly introducing examples of the actual machinery of our own time into their systems; still these books are necessarily rather intended to teach machinery to mathematicians, than mathematics to mechanists. It may be remarked that, at least in one branch of mechanics, the strength of materials, the value of theoretical and experimental science has been fully recognized by practical engineers, and the Britannia bridge may be quoted as a triumphant example of the advantages that arise when theory and practice go hand in hand."

Mr. Owen Jones, after presiding at a meeting, when Professor Royle delivered a Lecture on the arts in India, in the course of which he lamented the general ignorance on the subject, attributable in part at least to the limited nature of English education, which so studiously excludes all notice of the arts and sciences; said, "the time has arrived when it is generally felt that a change must take place—and we must get rid of the causes of obstruction to the art of design. . . . There now seems to be a general feeling and desire for art, and something must be done. I think the Government may be induced to assist in forming schools throughout the country on a different footing from that on which they are at present established."

Mr. Glaischer said, "The exhibition when erected and furnished with its varied contents, stood but a vast engine to be wielded to the public advantage or disadvantage. At present, it has contributed to extend the range of human knowledge, and will, in all probability, give rise to the institution of Industrial Schools, which, when once established,

will hardly be relinquished. These Industrial Schools will cultivate the many, and their establishment, sanctioned by time, and increased in number, will cause the influence of the Exhibition of 1851 to be far spread and felt in all time to come."

I might multiply examples of these hints from these Lectures, almost *ad infinitum*. Quotations from but two more must serve my purpose. Hitherto most of these lecturers have tacitly or openly acknowledged superiority in Indian or French workmen; but we shall be told that in most instances they refer to questions of taste and beauty, not of excellence in other respects. Take one other department, in which British supremacy has long been unquestioned, and hear the evidence of Captain Washington, of the Royal Navy; hydrographer, if I mistake not, to the Admiralty. He tells us that, "the dimensions of a Spanish ship, conquered in 1761, served for a model for several years to the English Admiralty, and in the same manner eleven years after she came into our possession, we built after the *Invincible*, a French 74 gun ship, and thus got some fine ships, but the practice was not persevered in. The *Commerce de Marseilles* formed the ground work for the *Caledonia*, of 120 guns, launched at Plymouth in 1808; but the *Canopus*, of 84 guns, taken in 1798, and acknowledged on all hands to be an admirable specimen of naval architecture, was not adopted to be the model for 84 gun ships of the British navy, before the year 1821; and even then, by the mode of practical carpentry of the hull pursued in our dockyards, and the weight of stores and provisions considered necessary for efficiency, the whole weight of the ship was increased to such an extent that the displacement caused by it, brought the lower deck midship port of the British 84, full 18 inches nearer the water than that of her French prototype! It is needless to follow the history further; suffice it to say, that all who served in the blockading fleets during the last war were painfully alive to the fact of the comparative inferiority of our ships to those of France and Spain, in speed, stability and readiness in manœuvring. It is true that the skill of our commanders, and the courage of our seamen, eventually succeeded in triumphantly asserting our naval superiority, but *much loss of life might have been spared had our ships in form been more on a par with those of our opponents.* Let me not be misunderstood. I am far from wishing to speak slightingly of those who have done good service to their country, or to deny the great merit of many of our practical builders; but there must be some reason for the admitted inferiority above alluded to; and I can only attribute it to the cause that in France and Spain, and other continental countries, the aid of science has been called in, and some of the greatest mathematicians of the age have turned their attention to the improvements of the shipping

of their country. Colbert, the enlightened Minister of Louis XIV, employed Renau, who was, we believe, the first French author that wrote on the theory of ships. He was followed by the two Bernouillis, by Pere la Hoste, by Bouger, Euler, by the Spaniard Don Jorge Juan, by Rimini, de Borda, l'Abbé Bossut, the Swedish Chapman, Chenehot, Clairbois, Dupin, and others, whose writings and discussions must have had a powerful effect towards bringing about the improvements introduced into the navies of France and Spain. What has been done in England to set against such names? The only English treatise on ship-building that can lay claim to a scientific character was published by Mungo Murray, in 1754; and such was the encouragement he received that he lived and died a working ship-wright in Deptford Dockyard. England has not, to this day, one original truly scientific treatise on the subject in her language. . . . The most valuable contributions to this science are the papers written by the gentlemen of the School of Naval Architecture, established in 1811; yet after a few years suppressed. . . . Honour, however, to whom honour is due; the good seed they have sown we trust has not been lost; the correct principles of Naval Architecture, laid down by them, have become known and generally diffused."

After alluding to more recent valuable contributions by Creuze, Scott Russell, Professor Mozeley, Peake, and others, he complains that science has been at a discount, and adds, it had been proclaimed on higher authority within those walls, that "abstract science must be cultivated if we are not to fall in arrear of other nations. However, the term may be slighted by some, who from time to time have managed the affairs of this nation, the study of abstract science, and the systematic pursuit of the study cannot be dispensed with, if we wish to make true progress in a question which involves the considerations of such abstruse questions as dynamical stability and the oscillations of floating bodies. . . . The Exhibition has brought into striking relief the want of union between science and practice, the want of more intimate communication between scientific and practical men, and has shewn the mischief likely to arise if the wall of separation be not broken down.* Not only is this true in Naval Architecture, but as respects the want of elementary instruction of our Naval Officers. As steam advances, we must give a mathematical instruction to those who are to command Steamships, or we shall be left far astern in the race. Youngsters entering the navy may pick up some navigation when the other duties of a ship will admit of it; but as to any systematic instruction it is out

* An interesting paper by Lieut. Reade, R. N. read before the Society of Arts, published in its journal since this report was written, together with the discussion on it, is confirmatory of those views.

of the question. The result is, that when a few years later the boys come, as men, to study steam, it is no uncommon thing to find that they have to begin with decimals and the elements of algebra. How are we to maintain our ground with neighbouring nations, where a cadet is kept for the first two or three years after entering the navy strictly at his study?" And further on the Lecturer points out that a great inconvenience of the systematic pursuit of the study he had alluded to, was that there was very little recorded knowledge as to the various attempts at improvement which have been made. Thus it happened that the use of lead for sheathing was tried three times, at long intervals, in Britain, the later essayers being in ignorance of the experiments of those who had gone before them.

Turning to Dr. Lyon Playfair's Lecture, we find the subject of instruction for the industrial classes still more fully developed, and more strongly insisted on. Mr. Cole, endeavouring to answer as I have before remarked, this long array of testimony and declamation, the lesson taught by these unfavourable comparisons, said, he did not believe the French had so great an advantage in instruction or education as others had represented; that though more of the work-people there learned to read and write, yet they couldn't read and write what they chose and thought, and many lost those accomplishments from disuse. Perchance the many gained not much by merely reading and writing, but there was a farther education provided which they seem never to have forgotten. He thought it was perhaps a fair enough distribution of parts that the continent should furnish the science and the taste, and Britain the capital to buy it, and the capital and labour to turn it to profitable account in the industrial arts. He said too (this was in 1852) that the reason France had not held and could not hold an International Exhibition was that she was protectionist in her commercial policy. France, still protectionist in her policy in 1855, furnished at Paris a most splendid refutation of Mr. Cole's rash statement, and he now, as Secretary of the Art and Science Department of the Lords Committee of Council on Education, actively and energetically promoting the education of the industrial classes of Britain in art and science, must look with no great satisfaction on the other portions of his lecture I have cited. Some military man might perchance have pointed out even then (who does not know now? —the Crimean war having intervened) how infinitely inferior the appliances for our armies were to those for the French, owing to the deficient scientific education of the staff.* That war has revealed such fearful defects, that there has since been operated a perfect revolution in

* See on this point Montalembert's *Debat sur l'Inde*.

British military administration. On sea and land, in peace and war, the broad shoulders and strong arms and backs of Englishmen have been forced to bear more than their fair loads for lack of instruction in the means of lightening them. It is, oft-times, as if a man were made to wield a heavy hammer without handle or lever, because he is strong enough to lift and strike with it grasped in his hands. He does the work, indeed, and perchance does it well, but he wastes time and strength in doing it.

The lessons taught by the great Congress of Industry and Peace, and by the War, have been wisely pondered by the British people. I shall have occasion to speak of some of the fruits of the study of the former which I saw. First, however, I would pray your attention to Dr. Playfair, a reference to whose well-considered lecture led to these remarks. He had undertaken the task of pointing out the effects of the progress of chemical science on the manufactures in the Exhibition, and after tracing how much that interesting science had done for industrial art, and for economy in manufactures in Britain, he turns to the more general question of the lesson which the Exhibition in this department taught about the relative progress of Britain and other nations. I will conclude my extracts from these lectures by giving this portion of Dr. Playfair's admirable performance almost entire. He says :—" All the instances cited are real consequential supports of a tenet which has already been discussed—that the progress of abstract science is of extreme importance to a nation depending upon its manufactures. . . . The published opinions of Babbage and Herschel, men who have a right to pronounce judgment on this subject, assure us that England is rapidly declining in science. It is most important that we should ascertain the real cause of this decline. The cause would appear to be that we chiefly honor those who are useful in our time and generation; that our eyes are too eagerly bent upon the golden prize, for which we are all running; and that we can only afford to throw a kind of theoretical squint of recognition on those men who are looking for sublime truths, careless as to whether they will have any immediate effect on industrial progress. And yet it is those very men that give strength to the sinews of a future generation, enabling it to keep its place in the industrial struggle of nations. Do not misunderstand me. Science never looks so beautiful as when she aids man to increase his resources and comforts; but the dove would not have brought the olive-branch to the ark of man's hopes unless she had been able to take a higher and longer flight than that embraced in the direct route to the tree whence she came. . . A rapid transition is taking place in industry; the raw material, formerly our capital advantage

over other nations, is gradually being equalized in price, and made available to all by the improvements in locomotion; and Industry must in future be supported, *not by a competition of local advantages, but by a competition of intellect.* All European nations except England have recognised this fact; their thinking men have proclaimed it; their governments have adopted it as a principle of state; and every town has now its schools, in which are taught the scientific principles involved in Manufactures, while each metropolis rejoices in an Industrial University, teaching how to use the alphabet of science, in reading manufactures aright. Were there any effects observed in the Exhibition from this intellectual training of their industrial populations? The official reserve necessarily imposed upon me as the Commissioner appointed to aid the juries, need exist no longer, and from my personal conviction I answer, without qualification, in the affirmative. The result of the Exhibition was one that England might well be startled at. Wherever—and that implies in almost every manufacture—science or art was involved as an element of progress, we saw, as an inevitable law, that the nation which most cultivated them was in the ascendant. Our manufacturers were justly astonished at seeing most of the foreign countries rapidly approaching, and sometimes excelling us in manufactures our own by hereditary and traditional right. Though certainly very superior in our common cutlery, we could not claim decided superiority in that applied to surgical instruments; and were beaten in some kinds of edge tools. Neither our swords nor our guns were left with an unquestioned victory. In our plate-glass, my own opinion—and I am sure that of many others—is, that if we were not beaten by Belgium, we certainly were by France. In flint-glass our ancient prestige was left doubtful, and the only important discoveries in this manufacture were not those shown on the English side. Belgium, which has deprived us of so much of our American trade in woollen manufactures, found herself approached by competitors hitherto unknown; for Russia had risen to eminence in this branch, and the German woollens did not shame their birth-place. In silver-smith work we had introduced a large number of foreign workmen as modellers and designers; but nevertheless we met with worthy competitors. In calico-printing and paper-staining our designs looked wonderfully French; whilst our colors, though generally as brilliant in themselves, did not appear to nearly so much advantage, from a want of harmony in their arrangement. In earthenware we were masters as of old, but in china and porcelain our general excellence was strictly denied; although individual excellence was very apparent. In hardware we maintained our superiority, but were manifestly surprised at the rapid advances making by other nations. . . .

"It is a grave matter for reflection, whether the Exhibition did not show very clearly and distinctly that the rate of industrial advance of many European nations, even of those who were obviously in our rear, was at a greater rate than our own; and if it were so, as I believe it to have been, it does not require much acumen to perceive that in a long race, the fastest sailing ships will win, even though they are for a time behind. This Exhibition will have produced infinite good, if we are compelled, as a nation, to acknowledge this truth. The Roman Empire fell rapidly, because nourishing its national vanity, it refused the lessons of defeat, and construed them into victories. . . . The influence of capital may purchase you for a time foreign talent. Our Manchester calico-printers may and do, keep foreign designers in France at liberal salaries. Our glass-works may, and do, buy foreign science to aid them in their management. Our potteries may, and do, use foreign talent, both in management and design. Our silversmiths and diamond-setters may, and do, depend much upon foreign talent in art and foreign skill in execution; but is all this not a suicidal policy, which must have a termination, not for the individual manufacturer, who wisely buys the talent wherever he can get it, but for the nation, which, careless of the education of her sons, sends our capital abroad as a premium to that intellectual progress, which, in our present apathy, is our greatest danger? It is well to inquire, in what we are so deficient, and what is the reason of the deficiency. Assuredly it does not consist in the absence of public philanthropy or want of private zeal for education, but chiefly rests on that education being utterly unsuited to the wants of the age. . . . If the main object of life were to fabricate literati, I would not dispute the wisdom of making classics the groundwork of our education. They are not utterly dead, but like the dry bones of the valley, they may come together, and have breathed into them the breath of life. . . . Classical literature and exact science are, however, wholly antithetic. If classical literature be sufficient to construct your spinning-jennies and bleach your cottons, your system of instruction is right; but if you are to be braced, and your sinews strengthened, for a hard struggle of industry, is it wise that you should devour poetry, while your competitors eat that which forms the muscle and gives vigour to the sinews. With such different trainings, who in the end will win the race? . . . How can we, as a nation, expect to carry on those manufactures by our sons of industry, when we do not teach them the nature of the principles involved in their successful prosecution. Solace ourselves as we will with vain thoughts of our gigantic position among nations. Greece was higher than we are, and where is she now? It does not require a lofty stature to see the farthest; for a dwarf on the shoulders of a giant

sees farther than the giant; not that he is less a dwarf, but that he has added the giant's height to his own. The Exhibition showed us many small states which had thus raised themselves on the shoulders of science within the last few years, while we are merely hovering about its skirt." . . . . . Again Dr. Playfair makes this appeal:— "Sir Humphrey Davy had said, 'You have a Newton, who is the glory not only of your own country, but of the human race. You have a Bacon whose precepts may still be attended to with advantage. Shall Englishmen slumber in that path which those great men have opened, and be overtaken by their neighbours? Say, rather, that all assistance shall be given to their efforts; that they shall be attended to, encouraged and supported.' All the aspirations of youth are towards science, especially that depending on observation, but we quench the God-born flame by freezing drenches of scholastic lore. . . It would ill become me, or any one, to speak disparagingly of the wisdom to be derived from a study of ancient authors, or to deny the immense importance of a knowledge of classical literature to education generally; nor would I like to see that education confined to stern realities, divested of the graces and poetry of polite literature. But I do, at the same time, vehemently protest against the exhaustion of our youthful years by a mere classical tuition, especially in the case of that large class of the community who, by their exertions in industry, have confided to them in a great degree, the prosperity of their country. As I do not think the teaching of classical literature as practised in our schools to be worthy of the name of education, neither do I apply that title to the communication of scientific knowledge alone, but you will observe that I have always spoken of it by the term 'instruction.' I am propounding no scheme of education, but strongly insisting that instruction in science should form an important part of the education of youth. Do not conceal from yourselves that this is the vital difficulty of the question. You may, and I hope will, soon raise an Industrial University; but this should have its pupils ready trained before it adopts them. Now, it must from itself act downwards, instead of working from the school upwards. Until our schools accept as a living faith that a study of God's works is more fitted to increase the resources of the nation than a study of the amours of Jupiter or Venus, our Industrial Colleges will make no material headway against those of the continent. In Paris we find a Central College of Arts and Manufactures, into which the students enter at an average age of nineteen years, already well trained in the elements of science, and going there to be taught how to use these elements for industrial application. Three hundred of the best youth of France are annually receiving at this College the most elaborate education; and the best proof of its practical

value is the great demand among manufacturers for its pupils, a diploma from it being equivalent to assured success in life. Can you wonder at the progress making by France in industry, when she pours every year one hundred and fifty of those highly educated manufacturers into her provinces? A similar education to this is going in almost all parts of Europe; but in England only one Institution exists. We have our University and King's College, it is true, and they are productive of much good; and similar Colleges exist in Scotland and Ireland; but their instruction in science terminates just where the Industrial Colleges of the continent begin. In fact the latter would be supplementary and a great support to the former. Government, acting on its own perception of right in its first national recognition of those truths, now happily dawning on England, has established a School of Mines; and the experience of this has shewn that it is much appreciated, though it labours under the disadvantage of a want of a preliminary education in its pupils, compelling its professors, in its commencement, to be more elementary in their instruction than is well compatible with the proper objects of such a school. . . . In this country we are in many respects remarkably unchangeable. Three professions, the Church, the Law, and Medicine, were supposed, some centuries since, to represent learning, and with a wonderful blindness they are still accepted as all sufficient. Industry, to which this country owes her success among nations, has never been raised to the rank of a profession. For her sons there are no honors, no recognised or social position. Her native dignity, if tacitly understood, has never been formally acknowledged. Science, which has raised her to this eminence, is equally unrecognised in position or honors, and, from her very nature, cannot attain the wealth which in Industry solaces the absence of social position. This restriction of learned honors to three recognised professions has a lamentable effect both on the progress of Science and of Industry. Its consequence is, that each profession becomes glutted with ambitious aspirants, who, finding a greater supply than demand, sink into subordinate positions, becoming soured and disappointed, and therefore dangerous to the community. Raise Industry to the rank of a profession—as it is in other countries,—give to your Industrial Universities the power of granting degrees involving high social recognition to those who attain them, and you will draw off the excess of those talented men, to whom the Church, the Bar and Medicine, offer only a slender chance of attaining eminence; and by infusing such talent into Industry, depend upon it, the effects will soon become apparent. In foreign countries, professions involving social rank and position arise with their requirements; in our nation, we are content with a meagre classification, scarcely

sufficient for the middle ages, and not even a reflection of our present wants. These considerations are not mean ones, for, as long as ambition exists in the human mind, their good or bad adjustment will exercise a beneficial or pernicious influence on Society. In the establishment of Institutions for industrial instruction, you, at the same time, create the wanting means for the advancement of science in this country. . . The progress of science and of industry in countries which have reached a certain stage of civilization ought actually to be synonymous expressions; and hence it follows that it is essentially the policy of a nation to promote the one which forms the springs for the action of the other. I think it, therefore, no mean advantage to this nation, that the establishment of Industrial Colleges will materially aid the progress of science by creating positions for its professors and for those who would willingly cultivate science, but are scared from it by the difficulties they have to encounter in its prosecution. . . . There is no country which ought so much to glory in the progress of science which is so much interested in its success as this happy island. Science has been a prime cause of creating for us the inexhaustible wealth of manufactures, and it is by science that it must be preserved and extended. . . . Foreign states have acknowledged the fact that successful competition can only be attained by an attentive study of science—by *making their sons of Industry themselves disciples of Science.* England, except in one instance, has hitherto not recognised this truth as a principle of state, and hence her science languishes, and her capital has to import it from other lands. This points to the necessity of the establishment of Industrial Colleges; but it implies, at the same time, an adaptation of juvenile education to the wants of the age."

Such was the lesson taught to the men of science and industry of Britain by the great Exhibition, and they acted on it. They have, by no means left it unimproved. Mechanics' Institutes already existed in the chief cities and towns, which were doing some good, offering by their Libraries the means of much amusement and a little instruction to their members, and the means of acquiring a good many odd bits of information from desultory lectures, such as those of which we have seen so much in Canada. Classes too, existed in many of them—evening classes generally, at which the poor apprentice learnt the rudiments of ordinary school courses of instruction, or eked out the scanty knowledge he had picked up at the poor schools to which he had been sent. The Society of Arts now applying itself vigorously to the promotion of the education of young men, robbed, by their parents' poverty and need of their early earnings from daily labour, of the means of pursuing their search after knowledge beyond the mere threshold of learning, set to work to aid these institutions

in their task by systematising their labors, and stimulating excellence among the pupils by examinations and rewards. Well conducted classes have come to be generally regarded as the most important work these institutions have to perform, and of late some of the old ones have changed their names to working men's colleges, and new ones have adopted that name. In many parts unions of institutions have been formed in order the better to secure the services of able lecturers who could re-deliver in turn to several institutions within a small circuit, one series of practical and instructive lectures, upon terms which brought them within the means of all, and to establish a general examination of pupils. The prize schemes have added great interest in all the operations of these schools of secondary or supplementary education. Year by year larger numbers of pupils have been sent up for examination, carrying off the certificates of the Society, which are really diplomas of capacity for the conduct of industrial affairs. And in the last year the Society has won from the Earl of Derby the right to send a certain number of its certificated pupils up to the competitive examinations for employment in the civil service.* The examination and certificate schemes thus opened up by the Society have been taken in hand also by the several English Universities, and, notwithstanding some difficulties and drawbacks necessarily attendant upon the initiation of so new and so great a work, with a great measure of success. Large numbers of pupils from the commercial or ordinary day and night schools, in all parts of Britain, came together at the places of examination to win the A. A. diplomas of Oxford, the certificates of Cambridge and London Universities. Complaint has been made that these examinations were too difficult, that the young men examined ought not to have been held to know all that was required of them. But as a test of the value of the teaching of many much be-puffed schools it was admirably devised. We have seen that the complaint urged against the training of the Universities was their almost entire devotion to Latin and Greek, and many a one boasted of the more practical knowledge imparted by these high-class commercial schools. The answer of the Universities was: we teach, by giving a profound knowledge of a few things, how to learn all. You, professing to teach many things, teach none well. We plough a small field, but plough deep, digging up the subsoil and manuring well; you scarify the surface of a large area, not properly developing the fertility of any portion. Ours is the better culture. We only profess to shew in two or three fields what men may afterwards do in many. You "scamp" all for the largest present crop.

* The last number of the Society's journal announces that at the last examination two of the Society's candidates won the first places.

And when the examination papers were gone over, it was found that the men from the "practical" schools were most wofully deficient in some of the ordinary practical branches, such as geography, history, grammar, &c. If these examinations serve to secure greater diligence and care in the teaching of these ordinary branches, and furnish young men of real proficiency with a certificate of attainments which will enable them to get on in the world, they will confer a great boon upon the country.

Thus, then, a great impetus has been given to the instruction of the industrial classes in the ordinary rudiments of knowledge. But it was not left for the Society and Universities to act alone. The Government and Parliament heartily co-operated in the work. Years before, in 1837, I believe, Lord Sydenham, then Mr. C. Poulett Thompson, and President of the British Board of Trade, had caused to be made, under the auspices of that Board, provision for the establishment of drawing schools in several of the great towns of the kingdom. Previously the Geological Survey of the United Kingdom had been undertaken, under Sir Henry DeLaBeche, who, in 1835, urged upon the Government of the day the benefits to be derived from the establishment of a Museum of Practical Geology, which was accordingly commenced in 1837. Out of this and its necessarily attendant laboratory arose the School of Mines. As early as 1839 Government sanctioned Lectures in connection with the Museum, upon Analytical Chemistry, Agricultural Chemistry, Metallurgy, Mining and Mineralogy, but the want of proper accommodation prevented the commencement of their delivery until 1851, in May of which year Prince Albert formally opened the new Museum and School in which a Lecture Room had been fitted up. Thus, in the very year of the Exhibition, we see industrial education provided for in one of its branches. The staff of lecturers now are,—

Dr. Hoffmann on Chemistry, with special reference to its application in the Arts and Manufactures.

Mr. Huxly on General Natural History.

Mr. Stokes on Physics.

Rev. R. Willis on Applied Mechanics.

Mr. Ramsay on Geology.

Dr. Percy on Metallurgy.

Mr. Waryngton M. Smith on Mining and Mineralogy.

Last Session they had 77 students, the highest number yet reached. In 1854, and subsequent years, popular Lectures on Natural History, Geology and Applied Mechanics were given in courses of 6 Lectures on each subject, the tickets being given out to working men at sixpence per course. All the tickets issued were eagerly sought for. Professor Owen, too, gave lectures there upon the fossil vertebrata of the British Museum,

attracting as many as 450 auditors. 116 students were attending the Chemical Laboratory, and 22 the Metallurgical Laboratory. These are some of the results arrived at in London in this one branch. But besides this,out of the stores of the Hyde Park and Paris Exhibition, there have been founded Museums of which I shall speak more fully hereafter. One of them is upon the Kensington Gore estate, nearly opposite the site of the Great Exhibition, where there has been erected a suite of buildings in which has been gathered a collection of many things, and here too is the head office of the new Government department. In 1857 the Science and Art Department of the Board of Trade was transferred to the control of the Lords Committee of Council on Education, under whose auspices it is now carried on. Here, therefore, are the Model Drawing Schools and the head management of all the drawing schools under Government patronage throughout the three kingdoms. Curious specimens of all sorts of beautiful wares and nicknackery from all parts of the world for the use of the students and the inspection of the public, and all the most approved books and apparatus for schools of all sorts are to be found here. Here, periodical exhibitions of the improved handiwork of the manufactures of Britain is held, and in the designs for carpets, for lace, for glassware, porcelain and pottery, tiles, castings, &c., made by pupils of the new Art Schools and executed by various manufacturers, you can see a gradual satisfactory progress towards supplying much that was lacking in the British work exhibited in 1851. There have been affiliated under the superintendence of this department 19 science schools, (of which 12 were navigation schools,) attended in 1851 by 3,120 pupils. But besides the schools thus established by the department there are others aided; and the total number of persons receiving scientific instruction in different degrees in that year was stated at 9172. In these Science Schools Mechanics, Physics, Chemistry and Natural History are taught, branches, for teaching which to the wealthier classes, ample provision is made in the Universities. Arrangements have been made with the Chester Training College for the training of science masters.

Dr. Lyon Playfair reported in 1857 on the Science Schools. "Although the numbers attending the schools, and the progress of the pupils, continue to be satisfactory, there does not appear to be any speedy prospect of many of them being wholly self-supporting or adequately remunerative to the master. The reason for this is, that only the children of the working classes attend the juvenile divisions of the schools; the adult divisions consisting chiefly of young men engaged in daily labour. This constituency for the schools, although the most desirable one which could be obtained, is not one calculated to render them self-supporting.

In Art Schools the sons and daughters of manufacturers, merchants, and other persons in easy circumstances, attend the classes during the day, paying high fees, which enable the masters to teach classes for working men at fees adapted to their means. But this class of persons do not go to Provincial Science Schools, so that the pupils wholly belong to the working classes It is necessary, therefore, for the proper support of local schools of science that larger money aid than hitherto should be given. The most healthy mode of doing this would appear to be by paying for the results of teaching in the way of small rewards to the taught, and more considerable reward to the teacher or to the institutions which secure the services of competent teachers. This system will be tried on a small scale by way of experiment in some of the schools during the present year, in order to ascertain the best condition for supporting such schools, without weakening the self-reliance and independence of the local committee managing the schools in question."

As there was no teaching of art on fixed principles supplied elsewhere, either for the upper or lower classes, the state was obliged to organize and superintend a system of instruction from the very beginning, and to create a training school for art-masters.

The Art Schools, formerly called schools of design, were started, as we have seen, long before, in 1837, under Lord Sydenham's auspices, in order to improve the taste of artizans in matters of design, and render them more independent of the French in this regard, and continued under the jurisdiction of the Board of Trade. They had never thriven, however, very much, nor was there any rapid extension of their usefulness until the great lesson of 1851 had been learned and had aroused public attention. In the first ten years, on a system of direct grants in aid of the schools, only 23 schools were established. The grants had, in the mean time, been increasing, while the local support decreased. After the re-organization consequent upon the re-awakening of 1851, the schools were made as far as possible self-supporting, but by judicious management 46 schools were added in the 5 years from 1852 to 1856. Nor is it now made necessary to establish separate special schools for teaching elementary science and drawing. Rules are established whereby they may be introduced into primary and existing public schools. Ten or fewer of these offering an aggregate of 500 pupils and guaranteeing a fee of 6d per head, may obtain the services of a certificated teacher of art, and the aid of the department. This is a temporary provision until the primary education department supplies all the schools with masters who teach drawing, &c., as well as other things, to whom higher salaries are now offered, the desire being to have elementary instruction of this sort given in all primary schools. Besides

this direct action, the department also aids by examinations and prizes. At the close of the year 1857 the total number of local schools of art throughout the United Kingdom, including the district schools in the Metropolis, amounted to 68, and there were 139 public schools of the class of those under the inspection of the Privy Council, receiving instruction from the department teachers, with 17,640 scholars; 71 private schools receiving instruction from the teachers, with 2,895. The sum locally raised was only £624 against £3000 paid by Government. 39 ordinary schoolmasters and mistresses gave instruction to 1,914 pupils, and 1,323 schoolmasters and mistresses and pupil-teachers attended the schools. Although a recent act enables the people to raise local rates for free libraries and art and science schools, the local contributions named above were voluntary subscriptions. Cork alone has a rate. £10,945 were paid by the students as fees. Out of 8,519 students, whose occupations were returned, 1,545 had none before, 2,954 entered themselves simply as students, 282 were teachers, 377 pupil-teachers, 373 painters, 541 entered under the general description of mechanics, 358 clerks, 257 carpenters, 213 engineers, 180 engravers, 120 designers, 163 metal-workers, and 101 shop-keepers' assistants, 13 domestic servants, 4 stationers; and the rest in groups, of less than 100 each, distributed among a great variety of skilled industries. The Inspectors visit all the schools of art once in the year, when all the works of the students are examined. To the best, local medals are awarded, limited to 30 in each school, the average number heretofore actually taken being only 8. For each prize won by one of his pupils the teacher receives a certain sum as a reward. All the prize works are then sent up to London and examined together, and 100 national medallions awarded. For each medallion so won, the local school receives works of art to the value of £10 up to the maximum of £50 per annum. In the Metropolis alone, in 1857, there were 396 pupils in the training schools, 587 males and 116 females in the district schools, and 7,439 in the parochial schools, receiving art instruction under the auspices of the department. Such are some of the details of the mode in which facilities for education are being given in the schools under the patronage of the Art and Science Department of the Education Committee of the Privy Council.

But it is not by schools and lectures alone that this work is being done. In several places free libraries have been established where every man, who can get two rate-payers to vouch for his honesty and guarantee the books he uses against damage, can command the use of tens of thousands of volumes. In these free libraries are deposited copies of all the British Patent Office publications, with specifications of the inventions for which patents have been obtained; and to these any poor inventor

or student of mechanics has reference at any time. Great numbers of the working men take advantage of these libraries, and may be found every day consulting scientific works on subjects connected with their pet studies or daily avocations. I visited those established in Manchester, and its great suburb, Salford. In the former, I was much struck with the appearance of a pale, sickly man, in habiliments denoting the most abject poverty, if not squalid wretchedness, eagerly conning a scientific work, getting himself up, perchance, for the bringing out of some new machine destined to revolutionise some branch of manufactures, neglecting all things else to pursue some pet study. He, too, had free access to this splendid people's palace of a library, and the untold riches of knowledge it contained. I was assured by the curators in both these places that the cases of injury to the books were really so trivial, that they might be called in fact nothing at all beyond wear and tear, —three volumes being lost in a year, perchance, out of scores of thousands. And yet another means of education is brought to bear upon the people. The Great World Exhibitions have been temporary museums. Permanent museums and galleries of art had existed before; others have been added since. The great British Museum, with its mammoth library, into which a copy of every book published in Britain goes; its immense collection of objects of natural history, of antiquities, Egyptian, Assyrian, Grecian, Roman and British—and of geological specimens is there, a fitting national collection for the instruction of its learned men, but also made of late years useful to the people who reside in or go up to the capital: there too was the national gallery with its collection of pictures and sculpture—and the Vernon Gallery, and the Dulwich Gallery, and the palaces and old abbeys and churches each with its store of art treasures to refine the taste of the people, and each year rendered freer of access to them. The great national galleries in Paris and other continental capitals had done much thus to educate and refine the popular tastes there, but it was believed and constantly asserted that the people of the British Isles were not to be trusted with the use of such privileges, that they would destroy any treasures they were permitted to examine. The rich in this slandered the poor. They have been tried and they do not destroy. Attached to the Free Library at Salford is a Museum of Natural History and Geology, and galleries of the Fine Arts. I stood in one of the latter admiring a beautiful statue in Carrara marble, lent for exhibition by one benefactor of the institution, and a splendid picture near it, an "Ecce Homo," by Annibale Caracci, lent by another, (the one was only surrounded by a thin cord, the latter exposed upon a frame much like an ordinary easel) when there strolled in a tatterdemalion woman, such as might have asked alms of you on

the street here, with two little not-less-tatterdemalion children, carrying the quart cup in which she had taken the mid-day malt drink to her laboring husband. No one seemed to watch or heed her; she and her children strolled through the rooms unchecked, saw what was to be seen in the time they had at their disposal, and sauntered out into the beautiful Peel Park within the bounds of which the Museum was built, to gaze there on Noble's beautiful statue of the Queen, and the fine statue of Sir Robert Peel, and on the trees and flowers placed there to gladden their eyes and sweeten their hour of rest. Up out of the dirty streets, and the dust, and smoke, and din of the crowded city streets she had stolen away and brought the children, yet unfit for work in the great factories around, to get a breath of fresh pure air, and gaze on these stores of beautiful things fitted to de-brutalize and refine them, if to afford them no other lesson. I pointed the group out to the curator, Mr. Plant, who paid me, as your representative, every attention in his power. He told me there were many such parties came every day. Yet none did any damage to the articles exhibited. Go almost any day into the Louvre or Luxembourg, or of a fête day to Versailles, and see the tens of thousands of people passing in a continuous stream through these museums, and one will cease to wonder how all that their workmen do is tasteful.

But mere pictures and statues will not serve to store museums for the instruction of artizans and factory hands, or those seeking information about manufactures. Accordingly there have been established in London and Dublin, Industrial Museums properly so called, and a collection for one is being formed in Edinburgh. The articles gathered together in London from all parts of the world in 1851, were not all allowed to be scattered abroad again, nor was the collection of 1855 in Paris left undrawn upon. We have already seen that the Jermyn Street School of Mines in London was joined with a museum of Economic Geology, &c. Here you will find specimens of all the ores and building materials quarried and raised from mines in the British isles—with numerous specimens from abroad. Most of the metals are exhibited in the various stages of smelting and refining: and in the model and implement room you will find models of the machinery and implements used in the various stages of manufacture. Specimens illustrating the process of manufacture into articles of usefulness or adornment—the different stages of the manufacture of the best swords, and of stub and twist gun barrels, ornamenting and chasing silver ware, of enamelling, &c., are there. Do you wish to embark in any mining speculation, the geological map of all the surveyed districts is there before you, and in the Mining Record Office a sort of history of the working of nearly all the old mines open-

ed in Britain? Do you wish to build a house regardless of expense, or a church or other public edifice, and seek for the best stones for the purpose, there you will find specimens of all the best building stones known in Britain, with an analysis shewing their respective values. And in most cases where foreigners have introduced new and improved processes or materials into any manufactures, specimens of their handiwork and a description of their process is to be found there. So the Staffordshire pottery man, if he finds himself undersold or outsold by some imported article, will generally be able to learn here the secret of the foreigner's success. Thus, natives and foreigners may learn alike what Britain produces; the home manufacturers may learn the secret of his foreign competitor's success or failures. To a country like Britain, whose mineral wealth is almost boundless, (the annual value of the mineral products of Great Britain, exclusive of building stones and clays, exceeding £28,000,000, sterling,) this is of the highest importance.

At Kew, near Richmond, a village which may now be reckoned a suburb of London, are beautiful botanic gardens once kept for Royal pleasure, now made national. Here are specimens of all hardy trees in the open air, while immense glass houses contain great numbers of tropical plants, from great palm trees with leaves 10 or 12 feet long down to tiny creeping flowering plants. And here amidst so much that is beautiful and enticing to the citizen weary of the dusty streets, is erected another Museum, under the direction of Sir William Hooker, called the Museum of Economic Botany. Here are gathered together specimens of woods from all parts of the world. I saw many from Canada there, (not always as good specimens as might have been produced,) and many from Australia. Some of these were made up into articles of furniture, and for this our fellow colonists of Australia certainly have taken much the better place in the Museum. But woods are not here alone. Plants, flowers, nuts, fruit, barks, berries, all the useful products of the vegetable world are ranged here for inspection. Tobacco, and coffee, and tea, beans, peas and wheat, cucumbers and melons, nutgalls and nutmegs, spices and cinnamon, flax, hemp and cotton, and the fibrous plants out of which the semi-civilized nations of the East and of the Southern seas weave so many curious and beautiful things, caoutchouc and gutta-percha, the sugar cane and Indian corn; all these and many more fill room after room of a great building where all are free to come and go, and may gather from a sixpenny or a shilling catalogue abundant useful information about the forms, nature, growths and uses of the vegetable world. Specimens of the manufactures from these vegetable products are very generally exhibited along with

themselves. Those from caoutchouc and gutta percha would form of themselves a small museum.

What remained of the collections made at the great Exhibitions was transferred first to Marlborough House, where the Vernon Gallery now is, and later to the iron building erected at South Kensington. These consisted principally of the products of the animal kingdom and the manufactures from them. In the three Museums most of the articles have labels affixed to them which describe whence they come and the processes they undergo in preparation for the market, and the various stages of manufacture, so that even those who purchase no catalogues may glean much information from a study of the objects exhibited. But besides this Museum, three or four others have been gathered around it under the same roof. There is a collection of works of art; a collection of materials illustrative of ancient and modern, British and foreign modes of architecture. Photographs, casts, and electro-type copies of great works of art in Paris and other continental cities, are gathered here; the Soulages collection of many strange and curious things, in old furniture and decoration, is deposited here; many pieces of tapestry, one, a gift from Prince Napoleon; some oriental presents to Her Majesty, in all the barbaric magnificence of cloth of gold, are placed here to gratify public curiosity; a gallery of British paintings, presented by a spirited gentleman named Sheepshanks, containing several of Turner's and Landseer's paintings, and many by Mulready, Cope, Stanfield, Eastlake, Creswick, and others, and many original drawings for pictures by these and Wilkie, and others; to which, I learn, is about to be added a gallery of engravings. There too has been made a beginning of a gallery of British sculpture, where were works by and copies from Gibson, Bell, Spence, and other British sculptors of eminence, together with one of Powers' Greek slaves. Here too is an educational Museum, to which the various organizations for the promotion of education have sent specimens of school books, furniture and apparatus for public inspection, and the information of teachers and others, interested in providing facilities for teaching in primary schools. And besides all these there is a collection of the models of patented inventions; among which, I saw the working model of the first steam engine used in propelling a vessel in British waters. I cannot conclude my brief and very imperfect sketch of the wonders of this place without saying how much I was indebted to Mr. Thompson, of the educational Museum, for his unwearied kindness and courtesy. My work was not with his department—it was secondary and not primary education which I was seeking the means on your behalf, to aid and promote, yet Mr. Thompson gave up to me

a good deal of time, and furnished me many kind and useful suggestions.

To show the extent to which the advantages offered by these various museums have been made use of by the people, I may state that the experiment of lighting them up and opening them to the public in the evening, was first made in the season of 1857, to furnish every possible facility to the working classes; for, as Mr. Cole well observed in one of his lectures—it is much less for the rich, who can buy cabinet collections for themselves, and have access to other rich men's hoards, and can travel abroad to see foreign collections, that museums such as these should be established by the state, than for the poor work-people, who can only find time in the evening, or some half holiday, and never find money, but who have as great a curiosity and as great a thirst for knowledge as the richest and noblest in the land. The museum is open free an average of 21 hours per week in the day time – the remaining time a small charge being exacted to prevent the crowd from interrupting the work of the students. It is opened two or three evenings in the week for six hours altogether; yet 110,000 persons had visited the museum during the six evening hours per week in ten months, and only 85,000 during the twenty-one day hours. On Monday nights especially, the Englishman's great day of merry-making (some of them calling it St. Monday), the place, we are told, is filled with working-men and their families. And he expresses an opinion, a just one, I believe, that the museum, whither he may take his wife and children of an evening without cost, furnishes a most powerful counter-attraction to the gin-palace. Nor can I forbear to say in this connection what perhaps would come more strictly in order elsewhere. There is a large class of men who may be instructed, and perchance educated, by the eye and ear, who never would glean instruction from books which are wearisome to them. Many an ingenious mechanic will go a long distance to study a new engine or implement, who would never read of it in a book or paper, or would only muddle his brains with it if he did, just as we know intelligent agriculturists who study the points of good horses and cattle and agricultural implements at shows and fairs, who fall asleep over their books or agricultural journal. Preach as we may about the spread of knowledge by means of the press—there is a class, and that a very large and not pre-eminently stupid one, who will learn very many things sooner and better in a museum than in a book or periodical, as we know there are many who are taught at colleges and universities and elsewhere better by lectures, than from the perusal of books. The knowledge gathered from the reading of many books, the result of much painstaking and laborious research, are laid before them

there, if they will but carefully look and listen. The numbers given above in Mr. Cole's lecture were those from a date not given, up to the end of October 1857. [Continued to the ensuing May, the numbers were swollen to 212,623 day visitors, and 227,374 evening, the latter being therefore in the proportion of about 5 to 1 per hour. This shews the large number of people who are being thus educated. And the report of the authorities here with respect to their behaviour, is only a corroboration of that at Manchester: among these, over a quarter of million of visitors, not a single case of misconduct had occurred! Lectures were given in 1857 in the Museum Buildings on the Animal Kingdom in connection with the museum, and on the Fine Arts. The lecture theatre holding 450 persons, 350 seats were reserved for working men and their families, who on registering their names got tickets for 6d. a-piece for the course. The other tickets were sold generally at 1s. each, or 5s. the course. The room thus disposed of was always filled, sometimes inconveniently crowded. Thus the working men of the metropolis shew a desire for, and an appreciation of, the advantages for supplementary education there offered them. To extend its benefits a portion of the museum is sent round in turns to local schools of art for exhibition, and had been visited during the summer of 1857 by 135,000 persons in the provinces.

On proceeding to Ireland, I found that much had been done in Dublin to promote similar establishments. The Royal Dublin Society, long fostered and patronised by Government, had taken not only art and mechanical industry under its protection, but agriculture as well; and received, as early as 1800, an annual public grant of £15,500. There is at Dublin a museum of Irish industry, founded under the auspices of Sir Robert Peel in 1845, but it was not until 1852 that the buildings attained the state of completion which admitted the definitive arrangement of the several collections. Nor, in fact, may that task be said to be completed yet; the recent additions having not yet been worked into place. The animal, vegetable and mineral kingdoms are all combined here. Attached, also, is a scientific school, with lectures on Geology, Physics, Chemistry, Practical Chemistry, Botany, and Zoology. Sir Robert Kane is the Director General, and Professor Jukes (the Assistant Director General for Ireland of the British Geological Survey), the Professor of Geology. The visitors range between 25,000 and 32,000 per annum. The Royal Dublin Society keeps up its Agricultural Museum and the beautiful Botanic Gardens at Glasnevin separately—receiving for its labors £6000 annually. The great cattle shows of the Kingdom are held under its auspices. The Agricultural Museum was visited by 25,000 persons in 1856, (the museum being closed five months in 1857,) and the Gardens by 40,500 persons in the latter year,

it being open on some days free, on others at 6d., and on others at a still higher rate. They, too, have lectures, in addition to those of the Museum School, on Agricultural Chemistry, Meteorology, &c. It has also a Museum of Natural History, visited by over 30,000 in 1856, and a library of over 30,000 volumes, the attendance at which is not noted in the report. Besides the courses delivered in Dublin, there are lectures delivered in various other towns under the auspices of the Society, termed Provincial lectures, the localities themselves paying a portion of the amount required for the purpose of securing the services of competent lecturers. Examinations of those attending these courses have been held also with satisfactory results, and prizes awarded. The committee of the society reported that they had been eagerly sought after and attended by large and increasing audiences. The committee, after an experience of two years, justly regarded these examinations to be of the utmost importance in giving a practical value to the lectures, and as such they were appreciated by the public.

Scotland has been latest in these matters, partly, doubtless, because her Universities and other ordinary educational institutions have done more of the work than those in the sister kingdoms. But she too is forming her Museum, and Scientific School. A chair of Technology is already successfully established in the University of Edinburgh, with a considerable number of students attending Professor Wilson's class. When I visited the Scottish capital, the Professor, who is the Director of the Scottish Industrial Museum, was absent, enjoying his autumnal holidays. I found his laboratory however in the wing of the College of Surgeons. This laboratory, I learn, had been attended in the Session of 1857–8, by twenty pupils, besides a staff of assistants. Here I obtained leave to visit the collections made for the Museum, stowed away in an old building adjoining the University grounds, a good deal of it still remaining in the packing cases. An intelligent workman, acting apparently both as carpenter and curator, pulled off the coverings and showed me such things as were conveniently to be seen, accompanying the shewing with remarks shewing he at least had studied the collection pretty carefully. It is intended to connect the new building on the site of the old, with one of the wings of the University buildings in which is already placed the great Natural History collection, so that that Museum will be connected with those to be established. The grant for the building, however, had not been voted by Parliament, at its last Session, in violation, it was said, of the implied pledge given at the time the collection was ordered to be made. There are excellent Schools of Art as well as Picture Galleries, both at Dublin and Edinburgh, but they are more under the direct superintendence of the central department in London than the museums.

Thus I have endeavored to lay before you the provision which I found had been made for secondary or supplementary education in the capitals of the three British kingdoms. I began by endeavouring to point out how the great Exhibition had set the authorities and leading men at work to give to the artizans of Britain that excellence of taste and in training, in which it was made painfully apparent they were inferior to their neighbors, the French. Thence had come the example and the minatory lesson threatening an end to Britain's industrial supremacy, unless she exerted herself to make her work-people as well-fitted for the work they had to do as their great rivals. France had had half a century the start in the giving of art education to her people. We have already seen that in the last years of the last century the great Institution des Arts et Métiers was founded, which, besides the great Galleries of Art, had done so much to make Parisian workmen in all matters of taste, all articles in which elegance of design is an important element, foremost of all those in the world. I took occasion, therefore, to visit this institution. M. Tresca, the Sub-Director, retaining a kindly remembrance of the Canadian Commissioners to the great Exhibition of London and Paris, expressed himself much pleased with any opportunity to aid the scientific or public institutions of Canada, and promised that he would be glad to assist us to procure for our museum specimens of French raw products and manufactures, and furnished me with such information as I sought.

Descartes first conceived the idea of an institution with lectures for working men. His scheme was to build great halls for each trade, and annex to each of them a museum in which should be placed necessary or useful mechanical implements, or machines for the art to be there taught,and to each hall or museum he would have assigned a professor to explain to artizans the processes they are called upon to use. More than a century ensued ere his ideas were given any effect. A collection of machines formed by the Academy of Sciences was placed in the Louvre, where it had existed for a century at the time of the revolution of 1789. In 1775 Vaucanson formed the first public collection of machines and implements for the instruction of the working classes, and when he died, left the collection to the Government, this legacy forming the germ of the Conservatoire. A place being found for this collection by the Government, and a curator appointed, it was ordered that all inventors whose works were rewarded by the Government should be held to furnish models to the Conservatoire. It thus received, between 1783 and 1792, more than 300 new machines. The revolution did not destroy but aided to build up this Museum of the people. The Legislative Assembly created a commission on monu-

ments, with instructions to gather together for the use of the people out of the plunder of all the Royal collections, all that related to the furtherance of science, the arts and manufactures. This commission doing nothing, however, its duties were handed over to the Council of Public Instruction, which, with the aid of several distinguished men of science, performed its work satisfactorily, and the Convention created out of the savants a board to take charge permanently of the work. A decree followed on the 19 vendemaire, an 3, which ordered that there should be formed at Paris, under the title of the *Conservatoire des Arts et Metiers*, a public depot of machines, models, tools, designs, descriptions and books of all kinds, relating to arts and manufactures of which the construction and use should be explained by three demonstrators attached to the establishment. A designer was added to their staff. It was not until four years after that professors were appointed and the establishment was organized where it now exists, in the old priory of St. Martin-sur-le-champ, confiscated from the Monks at the time of the revolution, and thus permanently devoted to a highly important secular object. In the following year all the models and machines belonging to the state, and lying in the various other depots, were brought together here. In 1806, the school for youths, children generally of working men chosen from the various departments of France, was founded, and soon became a flourishing institution. There they were taught arithmetic, elementary and applied mathematics, the new system of weights and measures, statics, perspective drawing, applied mechanics, hydrodynamics, the working of machinery, linear drawing, the drawing of figures, design of ornaments, of machines and for architecture, designs for cloths and other manufactures. In those days this school furnished sappers to the army, employés to the bureau of fortifications, scholars to the artillery school at St Cyr, and a great many foremen of public works and of factories and workshops. In 1819, three chairs of a higher grade were added to the Conservatoire—of mechanics, first filled by Mr. Charles Dupin; of chemistry, by Clément Desormes; and of industrial economy, by J. B. Say: and 12 exhibitions of 1000 francs each were offered by Government for the aid of indigent students. In 1829 another chair was added of physical science applied to the arts, first filled by Mr. Pouillet. In 1839, the chairs were increased to 10. Great good was done by this school or college where chairs have been filled by most eminent men, and the progress of industrial art in France has been very much aided and fostered by the information thus diffused. But the old system of museum teaching, by demonstrators explaining models and machines fell into desuetude. The school and lectures absorbed all the care and resources of the management. Exertions have been made

under the present Emperor of the French to remedy this, and render the immense collection more useful. In 1853 the Emperor, by decree, made some reforms in its management, and added three more chairs; and in 1854 a last chair, that of *constructions civiles*, (civil engineering) was added. The staff of professors in this great industrial university now numbers as many as fifteen, as follows:—

Mechanics applied to the Arts.
Applied Mathematics.
Applied Chemistry.
Applied Physics.
Descriptive Geometry.
Industrial Chemistry.
Industrial Legislation.
Agriculture.
Agricultural Chemistry.
*The Ceramic Arts.
Spinning and Weaving.
Dying and preparation of tissues.
Zoology as applied to Agriculture and Industry.
Civil Engineering.
Industrial Statistics and Organization.

In his efforts to adorn Paris with great public edifices, the Emperor has not forgotten the *Conservatoire*. The mason and carpenter were busy when I was there adding to and improving the group of buildings.

Such are some of the appliances of education connected with the most complete Industrial Museum and University of the world, which has served to give Parisian workmen much of their pre-eminence. This Conservatoire and their numerous galleries of the fine arts, coupled, doubtless, with a certain natural genius and aptitude of the people themselves have served, we have seen, to make the Parisian workmen, in things beautiful and elegant, a proverb and a model everywhere. I toiled, for the leisure hours at my disposal on two days, through the immense stores here gathered together for the information of the people, in order to learn how much might here be learned, how months, nay, years might be spent here in the study of the means and appliances by which the industrial arts had been carried on, and of the wonders which human ingenuity, and science and industry had produced. I have attempted no detailed report on any collection: that would have been idle and useless. What I felt I had to do was to learn what these governments of the old world had done to instruct their work-people in the best

* In the programme of the course of 1857 and 58, I see no mention of this chair.

methods of doing their work, to dignify the labor of their hand by giving them science as an aider of their toil, at once a workfellow and an instrument.

The lesson to be learned from the examination of all, was only that which England had learned from France in 1851, and the success which had attended British efforts to follow or improve on French example. That lesson was not learned by the British Government alone: the Government certainly did not act on it alone, for we see that with that study spirit of independent, individual action which characterises the race, enterprising individuals, believing a taste for learning by means of great museums had been bred in the London world, raised means, and built that microcosm, the Sydenham palace, the most wonderful structure, and most wonderful collection of the products of human industry which were ever built and brought together by private means certainly, if governments have ever rivalled it. And there, recently, the experiment of lectures on the contents, and the arts of production connected with them have been tried, with what result I have not learned. The speculation has not been so fortunate as was desirable to the stockholders, but the benefit to the public has been immense, and a new company, it is said, is about to build its counterpart on the north side of London. Coming from those great cities of 1,000,000 and 2½ millions of inhabitants, people each, respectively, capitals of states numbering their thirty to forty millions of people, to our own little commercial metropolis of a province with rather less population than the greater city beyond the sea, we must, of course, reduce the extent of our labours and endeavours to a corresponding scale. But we need not abandon the hope of doing something useful to our fellow colonists in this direction, when we remember that the Norsefolk, in the little Scandinavian kingdoms, have done on the shores of the Baltic, what we may surely do as well here on the shores of Lake Lake Ontario and the St. Lawrence. They have entered successfully on these works, and so may we. We have organized a system of common, primary schools, and Normal Schools, and have numbers of High-Schools, Grammar Schools, Colleges and Academies, doing good service in the cause of education. We have three Universities labouring diligently to give men of means, and those intended for the professions excellent education, yet there is still something lacking to complete our set of educational establishments. We need also, under the immediate supervision of this Board, an Industrial University with affiliated Workingmen's Colleges in each considerable town or city in the Province. There is no one so poor that his child may not be spared for two, three or four years, to learn the mere elements of education. Then, alas, in Canada, as well as older countries, many think, and some truly know,

that their girls and boys must leave school and begin to earn partially or wholly their own livelihood. One goes into the counting room or behind the counter, the other to the workshop or the factory. The time for instruction, for sowing the seed of knowledge is past, and the few scattered shoots of learning are left to grow as they will, or wither if they will, without further culture or training. Here and there in the larger towns, a Mechanics' Institute and Mercantile Library Association may be formed, by means of which young people such as these are afforded access to newspapers, periodicals, books and lectures, and much desultory information is picked up; but in more than 99 cases out of the hundred, one may affirm that no steady persistent training and discipline is given to the mind, or a thorough knowledge of any branch of knowledge obtained. The worst fault is, that though much excellent entertainment is afforded—infinitely better entertainment than that acquired elsewhere in scenes of perhaps coarse dissipation—yet little productive knowledge is imparted, such knowledge as will make the shoemaker a better shoemaker, the blacksmith a better blacksmith, the builder or carpenter better fitted to execute the work entrusted to him. Far be it from me to urge anything against the laboring man's needful relaxation, or to blame him for seeking it in books, newspapers and lectures, which all serve to make him a more intelligent citizen :—

"The bow that's always bent will never spring."

Man cannot always toil, or bend his mind to the study of business—else he will break down, body and mind. But if a young man have two or three hours at his disposal of an evening, would he not do well to spend one of them in a museum or lecture hall, where he could improve himself in those branches of science necessary to made him a first class workman? No one will answer, nay. It should be the duty of the Board of Arts and Manufactures, with its affiliated institutions, to provide the means in every considerable town thus to fill up those leisure hours of the uneducated young man. It should be the duty of the Board of Agriculture to provide similarly, as far as possible, for those being brought up to farming pursuits. It is not enough to hold annual shows, though these are temporary museums of no little usefulness. In the cities of greatest resort there should be a perpetual exhibition of implements, machines and produce open freely, to be studied by the farmer or artizan, any day in the year, with a library of reference where standard works, and drawings and models of machines may be consulted. And it is also necessary to stimulate the indifferent and careless to diligence, by providing that those who avail themselves of the opportunities offered shall have an opportunity to prove their diligence and

proficiency, and receive a testimonial of it, which could not fail materially to promote his success in life.

It is needful then for the carrying into effect the work which the board has to do, to promote instruction by the three agencies, of permanent museums as well as periodical exhibitions in one or more of the chief cities of the province; by lectures and classes with examinations under the auspices of the various affiliated institutions; by libraries of reference and useful publications. We have one museum here, little known, however, and less consulted—a most excellent collection of Economic Geology, formed by the distinguished Director of the Provincial Survey, Sir William Logan and his assistants, one which well deserves the attention of builders and workers in stone, and those desirous of engaging in mining pursuits. The Statute under which this Board has been formed has provided authority for founding others and carrying out the other objects I have indicated; Parliament has not, unfortunately, provided the means. But much may be and must be done by manufacturers themselves. In Britain a large quantity, if not even a large proportion of the objects exhibited are presents from the great manufacturing establishments, who are glad thus to get their work brought under the notice of the hundreds of thousands who visit the museums. Many of our manufacturers would gladly do as much, I doubt not, if here, as in Britain, their names were placed upon the descriptive label affixed to the articles exhibited. Nor do I doubt that, through the good offices of the officers of those institutions, in Britain as well as France, specimens of the products of those countries, similar to those there exhibited, which would supplement our own, could be obtained upon comparatively easy terms—in some instances gratuitously. I have already stated that I received satisfactory assurances upon this subject from M. Tresca, the Sub-Director of the *Conservatoire des Arts et Metiers*. After receiving this assurance I made an application to the proper officers of the Science and Art Department of the British Lords Committee of Council on Education, to ascertain in how far they would be disposed to furnish similar assistance, and on what terms we could procure from them the designs, casts, &c., necessary as well for the establishment of the school of design for women, contemplated by our Act of Incorporation, as for an educational feature in the chief museum. I had previously had an interview with the Secretary of the Department, Mr. Cole, C.B., on the subject, and had reason to hope for a favourable reply. Unfortunately my first letter miscarried, and when the second was sent in he was sick and absent, and continued to be so until I was compelled to leave England. I have not yet received any reply. Sir Roderick Murchison and Professor Ramsay, of the Museum of Economic Geology, cordially promised their assistance, and the

former has presented this Board, through me, with a complete set of the publications of his department. Deeming it desirable to procure for the library of reference, a set of the British Great Seal Patent Office publications furnished to the free libraries in Britain, I made application through Mr. Woodcroft, the Secretary of that Department, for them, and received a courteous reply, encouraging me to hope that the request would be granted, but unfortunately, just after, the meetings of the Commissioners ceased for the season, and I was unable to bring over these books with me as I had desired to do. I trust that they may be procured in time however to come over by one of the earliest steamers in the coming spring. But even before these can be properly lodged, farther accommodation will be required,—they amount in all to about 1000 volumes—and still greater accommodation will be necessary ere a museum can be formed and placed upon a proper footing. It were idle to gather materials together, to repose like those at Edinburgh, under the dust of an outhouse, running the risk of damage or destruction. Meantime there remains the other means of secondary education given above, which, even with the limited means at our disposal, we may employ. The delivery and publication of Lectures on important branches of applied Economic Science may be secured; and the establishment and encouragement of classes in various portions of the country, in connection with the affiliated institutions, may be proceeded with, and to these ends it seems necessary now to direct the efforts of the Board. There is here an ample field for labour. Yet the Act will require perhaps some amendments to enable you to proceed as far as is desirable. There should be some power of inspection and control exercised to prevent the wasting of money on Mechanics' Institutes which exist only in name, which render no really useful service in the work of supplementary education, which have no support from the people to be benefitted. A Primary School can only get its portion of the Provincial grant, by the raising of a local rate equal to or greater than it. Agricultural Societies, in like manner, are compelled to raise a proportionate amount for the local prizes and hand over a certain amount toward the Provincial Agricultural fund, and a superintendence over the expenditure of each is exercised by a body constituted for that purpose. Such power of superintendence and such limits of grants to a due proportion with the sums locally raised, would enable the Government to increase the grants to the really effective Mechanics' Institutions, and enable them and the Board to perform, in some degree satisfactorily, the work they have in hand. And, as speedily as the revenues of the country will permit, we may hope from the enlightenment of our legislators, a sufficient grant to enable us to call our library and museum into existence. Since my

return, the City Council have taken the initiative in appointing a Committee of conference with this Board and the Board of Agriculture respecting the erection of the necessary buildings for the accommodation of both, and the holding of periodical Exhibitions. Perhaps this movement may happily ere long lead to our obtaining a fitting local habitation as well as name. Meantime, if our means will permit, we should lose no opportunity of securing such accommodation as will permit the commencement of a museum of Canadian Industry.

It were well for the country if the public generally were brought to see that this work of secondary or supplementary education is a most important one. It is an effort to make the laborer more truly worthy of his hire; to fit the artizan to earn more money and do better service to the state. All that adds to the intelligence and capabilities of the working-men of the producing classes must add so much to the riches of the country. Knowledge truly gives power and gives wealth. The manufacturing interest of Canada is fast growing to be a large one. Doubtless agriculture occupies the first rank in this country, and claims the greatest share of the attention of our legislators, but the artizan stands next, and just in proportion as he is educated in the best methods of manufacture will he be able to stand against foreign competition. The *habitant* who once would not learn the use of new implements and machines, but ploughed with his wooden plough, and thrashed with a flail, and winnowed by hand, is gradually adopting the modern plough, and gives employment to thrashing and winnowing machines which perambulate the country. Formerly he could not compete with his more intelligent neighbour, and was growing poorer and poorer. Now he finds himself more his neighbour's equal, and is laying up riches. So the manufacturers of Canada, if they will give good heed to the proper education of working-men for the avocations which they desire to see them and to hire them to pursue, will soon find their riches and the riches of the country increased. Learning and labor of the hand have too long been dissociated. We hear demagogues talk often to the laboring men of the dignity of labor. But that labor only is dignified to which knowledge and intelligence or high purpose lends its lustre. The labors of the pack-horse, the ox and the ass are not spoken of as having dignity, nor can that of the man who, day by day, like pack-horse or ox goes through a certain round of employment on which he spends no thought, be justly so spoken of. A machine has no dignity beyond that imparted by the intelligence of its maker, neither has the mechanical performance of labor by man: but the most sordid labor gains dignity from its intelligent performance. The work we have to do then is to

add this dignity to the labor of Canadian artizans, and by so doing add riches to the state.

I submit the information thus gleaned with the accompanying suggestions, gentlemen, for your careful consideration ; to be acted upon as opportunities offer and your wisdom dictates, meantime remaining

Your very Obedient Servant,

B. CHAMBERLIN.

Montreal, 24th December, 1858.

The Board of Arts and Manufactures for Lower Canada in Account Current with N. B. Corse, Treasurer.

Dr. **Cr.**

To Amount of Parliamentary Grant, 1857.....	$1000 00	By paid Secretary's allowance for assistance, &c	$181 00
" Do do do 1858.....	2000 00	" Petty disbursements, Postage, &c.....	21 04½
" Percentage of Grant to Montreal Institute for 1858.....	20 00	" Furnishing Rooms, &c	107 00
		" Rental of Board Rooms, Lecture Hall, &c.	146 00
" Percentage of Grants to 7 Affiliated Institutes, viz: Montreal, Chambly, Sorel, St. Hyacinthe, St. Césaire, Iberville and Lachute, for 1857, at $20 each.....	140 00	" Ship Model and Case	100 00
		" Secretary's Expenses in Europe.....	244 45
		" Printing, Translation, Stationery, &c...	195 00
		" Advertising	190 00
		" Allowance to Classes.....	200 00
		" Expenses of Lecturers.....	58 45
	£3160 00		
Balance in hand.....	1715 32	" Balance in hand.....	1715 32
			$3160 00

JAN. 6/31